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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of WRF mesoscale simulations and particle trajectory analysis for the MILAGRO field campaign" *by* B. de Foy et al.

B. de Foy et al.

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The authors are very grateful to the referees for their careful reviews which have been used to improve the quality of this paper.

Referee #1:

General Comments Yes, we have considerably shortened the paper and moved a lot of the cluster names and discussion to supplementary material.

Specific Comments 1. While we appreciate the comment, it is our belief that a modelling paper should have actual results in addition to the evaluation. Having shown the simulations to be of useful accuracy, this section contains results

that are pertinent to the study at hand and compares the conclusions to existing work on the subject. Readers who are not interested can easily skip it, but it might be lost if it is relegated to supplementary material. Hopefully, the considerable shortening of section 6 makes this more justifiable.

2. We agree with you. The problem lay in the multiplication of cluster groups. What we have done is to move the radar wind profiler clusters to the supplementary material. The discussion of the specific radiosonde clusters was also moved to the supplementary material, although we retained an overall view within the paper. Finally, the description of the surface clusters was changed so that it does not require the reader to remember cluster names. By shortening this section by 2/3 to 3/4, we hope that we address your comment despite keeping section 7, as outlined above.
3. We have restructured the literature review (see below) and shortened the discussion in the summary. We still think that the theme of evaluation vs. validation is important, and believe that Oreskes' work deserves to be mentioned in this context.
4. This is rewritten and reorganised to make the message more apparent.
5. Yes, they are merely two different ways of looking at the same transport calculation. This was clarified in the text.
6. Yes, we've eliminated them.

Minor Comments

1. Yes, a combustion plume, changed in the text.
2. Figures re-arranged.
3. All domains are smaller, and domains 1 and 2 have coarser resolution.
4. Scatter plots were added.
5. Tula and Popo added to the plots.

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6. From this study, it would seem that statistical metrics suffer from discrepancies on time scales shorter than a couple of hours. Overall however, the cluster analysis shows that the median transport is better characterised than the metrics would suggest. This explains why the wind transport is reasonably simulated despite the poor metrics, and why relying on metrics can be misleading. The discussion in the summary was improved to include this point.

Referee #2:

Substantive Questions

1. In previous testing, we have not found significant differences between one-way and two-way nesting. We have therefore adopted one-way nesting for the sake of speed and convenience.
2. Convective parameterisation was not used in either MM5-FLEXPART or WRF-FLEXPART, as the fine resolution domain represents some of the convection explicitly.
3. We felt that while we wanted to keep the model configurations as close as possible, we nonetheless wanted realistic options as they would be used in normal modelling. In this context, MRF is included for backward compatibility, but most modellers now use the YSU scheme instead. This is clarified in the text.
4. Yes, changed.
5. Yes, we have removed all instances of correctly to be in line with the message of the paper.

Minor Issues

1. Yes, units changed in text. For recirculation, language clarified - we mean leaving the basin and coming back.
2. No, O3-South days have a convergence line leading to high ozone, South Venting days blow the plume straight out of the basin and are clean.

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3. Section 1.2 was rewritten to make this clearer. Evaluation seeks to determine fitness for a specific use whereas validation seeks to make a more general comment about model accuracy that fails to account for physical uncertainty.
4. 1 degree resolution was used.
5. No, because it is one-way nesting. While 3 is the most common, 4 is an acceptable choice - and has not been found to affect the results in prior testing.
6. Yes, a map was added. The large scale maps are labelled in degrees, the fine scale maps have the UTM coordinates which act as a built-in scale.
7. Text clarified - it is growth because the default data goes back to 1992.
8. Yes, CFA explanation rephrased.
9. 13 soundings were missing - clarified in text.
10. Yes, equations added.
11. This has been found in the past, the discussion was expanded in reference to Mass et al., 2002.
12. Yes, the sentence was toned down.
13. The figures were separated into 2 to be larger in the final version.
14. Yes, we've performed CFA by episode. The strength of CFA is the combination of longer time periods. The results by episode can be interesting in the course of debugging, but do not alter or contribute to the results shown in the paper.
15. This whole section with the numerous cluster names has been moved to the supplementary material.
16. Message toned down.

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Interactive Comment

17. The text was clarified on this point. The statistics are ruined by short term variations in winds, even though the models capture the overall flow features and therefore adequately represent transport for scales larger than a couple of hours.
18. All occurrences of “Correctly” removed.
19. Yes, text clarified.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 2113, 2009.